

In the Claims:

Please amend the claims as follows:

1-16. (canceled)

17. (currently amended) A displacement control method, comprising:

a calculating step of calculating a displacement control signal for driving a proportional electromagnetic valve based on a displacement command; ~~and~~

an adjusting step of adjusting a displacement angle of a hydraulic device by driving the proportional electromagnetic valve with the displacement control signal calculated in the calculating step, and applying a displacement control pressure generated from the proportional electromagnetic valve to a displacement adjusting device; and

a judging step of judging whether a learning control mode is selected or a normal control mode is selected, wherein

the displacement control signal is calculated in the calculating step based on the required displacement control pressure, the required displacement control pressure being based on a reference characteristic representing a relationship between a required displacement control pressure required to provide a displacement angle corresponding to a displacement command and a required displacement control signal required for the proportional electromagnetic valve to generate the required displacement control pressure,

the calculating step further ~~comprising~~ comprises when the learning control mode is selected:

calculating based on the reference characteristic a minimum-side displacement control pressure corresponding to a minimum-side displacement control signal required to achieve a minimum-side displacement that is set in advance for learning and calculating a maximum-side displacement control pressure corresponding to a maximum-side displacement control signal required to achieve a maximum-side displacement that is set in advance for learning,

detecting a pressure generated from the proportional electromagnetic valve when the proportional electromagnetic valve is driven with the minimum-side displacement control signal as a first measured pressure,

detecting a pressure generated from the proportional electromagnetic valve when the proportional electromagnetic valve is driven with the maximum-side displacement control signal as a second measured pressure,

calculating as learned values a first difference between the minimum-side displacement control pressure and the first measured pressure, and a second difference between the maximum-side displacement control pressure and the second measured pressure,

the calculating step further comprises when the normal control mode is selected:

in response to an operator-generated displacement command, calculating a correction amount based on the first and second differences and the operator-generated displacement command,

correcting a required displacement control pressure required to provide a displacement angle corresponding to the operator-generated displacement command with the correction amount; and

calculating the displacement control signal based on the corrected required displacement control pressure with reference to the reference characteristic.

18. (currently amended) A displacement control method, comprising:
a calculating step of calculating a displacement control signal for driving a proportional electromagnetic valve, based on a displacement command; and
an adjusting step of adjusting a displacement angle of a hydraulic device by driving the proportional electromagnetic valve with the displacement control signal calculated in the calculating step, and applying a displacement control pressure generated from the proportional electromagnetic valve to a displacement adjusting device; and

a judging step of judging whether a learning control mode is selected or a normal control mode is selected, wherein

the displacement control signal is calculated in the calculating step, based on the displacement command, referring to a reference characteristic representing a relationship between the displacement command and a required displacement control signal required for the proportional electromagnetic valve to generate a required displacement control pressure required to provide a displacement angle corresponding to the displacement command,

the calculating step further ~~comprising~~ comprises when the learning control mode is selected:

calculating a minimum-displacement-side control signal used for learning and a maximum-displacement-side control signal used for learning based on the reference characteristic, and

detecting pressures generated from the proportional electromagnetic valve when the proportional electromagnetic valve is driven with the minimum-displacement-side control signal and the maximum-displacement-side control signal as first and second measured pressures, respectively;

calculating, based on a relationship between the minimum-displacement-side and maximum-displacement-side control signals and the first and second measured pressures, a minimum displacement control signal for causing the proportional electromagnetic valve to generate a displacement control pressure corresponding to a minimum displacement angle, and a maximum displacement control signal for causing the proportional electromagnetic valve to generate a displacement control pressure corresponding to a maximum displacement angle;

calculating a first difference between the minimum displacement control signal and the minimum-displacement-side control signal used for learning, and a second difference between the maximum displacement control signal and the maximum-displacement-side control signal used for learning;

the calculating step further comprises when the normal control mode is selected:

~~generating, calculating a correction amount corresponding to the displacement command~~ based on the reference characteristic, ~~and the first and second differences, a learned characteristic representing a relationship between a displacement command and a required displacement control signal corresponding to the displacement command~~ and the displacement command;
and

~~calculating based on the learned characteristic a correction amount based on the displacement command; and~~

correcting with the correction amount the displacement control signal calculated in the calculating step based on the displacement command referring to the reference characteristic, with the correction amount.

19. (previously presented) A displacement control method according to claim 17, wherein;

when detecting the first measured pressure, the displacement control signal is increased from a minimum displacement so as to set the minimum-displacement-side control signal for learning, for use in detection of the first measured pressure; and

when detecting the second measured pressure, the displacement control signal is reduced from a maximum displacement so as to set the maximum-

displacement-side control signal for learning, for use in detection of the second measured pressure.

20. (previously presented) A displacement control method according to claim 18, wherein:

when detecting the first measured pressure, the displacement control signal is increased from a minimum displacement so as to set the minimum-displacement-side control signal for learning, for use in detection of the first measured pressure; and

when detecting the second measured pressure, the displacement control signal is reduced from a maximum displacement so as to set the maximum-displacement-side control signal for learning, for use in detection of the second measured pressure.

21. (currently amended) A displacement control device, comprising:

a calculating unit, the calculating unit calculating a displacement control signal for driving a proportional electromagnetic valve based on a displacement command; and

an adjusting unit, the adjusting unit adjusting a displacement angle of a hydraulic device by driving the proportional electromagnetic valve with the displacement control signal calculated by the calculating unit, and applying a displacement control pressure generated from the proportional electromagnetic valve to a displacement adjusting device, wherein with reference to a reference

characteristic representing a relationship between a required displacement control pressure required to provide a displacement angle corresponding to a displacement command and a required displacement control signal required for the proportional electromagnetic valve to generate the required displacement control pressure, the calculating unit calculates the displacement control signal based on the required displacement control pressure,

wherein

the calculating unit judges whether a learning control mode is selected or a normal control mode is selected,

the calculating unit, based on the reference characteristic, calculates a minimum-side displacement control pressure corresponding to a minimum-side displacement control signal required to achieve a minimum-side displacement that is set in advance for learning, and a maximum-side displacement control pressure corresponding to a maximum-side displacement control signal required to achieve a maximum-side displacement that is set in advance for learning, when the learning control mode is selected,

the displacement control device further comprises a pressure detector which detects a pressure generated from the proportional electromagnetic valve when the proportional electromagnetic valve is driven with the minimum-side displacement control signal as a first measured pressure, and detecting a pressure generated from the proportional electromagnetic valve when the proportional electromagnetic valve is driven with the maximum-side

displacement control signal as a second measured pressure, when the learning control mode is selected,

the calculating unit calculates as learned values a first difference between the minimum-side displacement control pressure and the first measured pressure, and a second difference between the maximum-side displacement control pressure and the second measured pressure, when the learning control mode is selected, and

the calculating unit calculates a correction amount based on the first and second differences and a displacement command when the displacement command is generated, and corrects a required displacement control pressure required to provide a displacement angle corresponding to the generated displacement command with the correction amount, when the normal control mode is selected, wherein-and

the calculating unit calculates the displacement control signal based on the corrected required displacement control pressure with reference to the reference characteristic, when the normal control mode is selected.

22. (currently amended) A displacement control device, comprising:
- a calculating unit for calculating a displacement control signal for driving a proportional electromagnetic valve, based on a displacement command; and
 - an adjusting unit for adjusting a displacement angle of a hydraulic device by driving the proportional electromagnetic valve with the displacement control signal calculated by the calculating unit, and applying a displacement control

pressure generated from the proportional electromagnetic valve to a displacement adjusting device, wherein

the calculating unit judges whether a learning control mode is selected or a normal control mode is selected.

the calculating unit calculates the displacement control signal based on the displacement command, referring to a reference characteristic representing a relationship between the displacement command, and a required displacement control signal required for the proportional electromagnetic valve to generate a required displacement control pressure required to provide a displacement angle corresponding to the displacement command, the displacement control device further comprising:

a pressure detector which detects pressures generated from the proportional electromagnetic valve when the proportional electromagnetic valve is driven with a minimum-displacement-side control signal used for learning and a maximum-displacement-side control signal used for learning, respectively, as first and second measured pressures, when the learning control mode is selected;

a displacement control signal calculating unit, the displacement control signal calculating unit providing a minimum displacement control signal to cause the proportional electromagnetic valve to generate a displacement control pressure corresponding to a minimum displacement angle and a maximum displacement control signal for causing the proportional electromagnetic valve to generate a displacement control pressure corresponding

to a maximum displacement angle, based on a relationship between the minimum-displacement-side and maximum-displacement-side control signals and the first and second measured pressures, when the learning control mode is selected;

a difference calculating unit, the difference calculating unit calculating a first difference between the minimum displacement control signal and the minimum-displacement-side control signal used for learning, and calculating a second difference between the maximum displacement control signal and the maximum-displacement-side control signal used for learning, when the learning control mode is selected;

~~a learned characteristic generating unit, the learned characteristic generating unit generating a learned characteristic representing a relationship between a displacement command, and a required displacement control signal corresponding to the displacement command, based on the reference characteristic and the first and second differences;~~

a correction amount calculating unit, the correction amount calculating unit calculating a correction amount based on the reference characteristic, the first and second differences, and the displacement command, referring to the learned characteristic when the normal control mode is selected; and

a displacement control signal correction unit, the displacement control signal correction unit correcting the displacement control signal calculated by the correction amount calculating unit based on the

displacement command referring to the reference characteristic, with the correction amount, when the normal control mode is selected.

23. (previously presented) A construction machine, comprising a displacement control device according to claim 21.

24. (previously presented) A construction machine, comprising a displacement control device according to claim 22.

25. (new) A displacement control method according to claim 17, wherein:
the calculating step further comprises when the learning control mode is selected:

generating a correction characteristic representing a relationship between a correction pressure and a displacement command, based on the first difference and the second difference and the minimum-side displacement corresponding to the first measured pressure and the maximum-side displacement corresponding to the second measured pressure,

in the calculating step when the normal control mode is selected:

in response to the operator-generated displacement command, a correction pressure is calculated as the correction amount based on the correction characteristic and the operator-generated displacement command,

the required displacement control pressure required to provide a displacement angle corresponding to the operator-generated displacement command is corrected with the correction pressure.

26. (new) A displacement control device according to claim 21, wherein:
the calculating unit generates a correction characteristic representing a relationship between a correction pressure and a displacement command, based on the first difference and the second difference and the minimum-side displacement corresponding to the first measured pressure and the maximum-side displacement corresponding to the second measured pressure, when the learning control mode is selected;

in response to the generated displacement command, the calculating unit calculates a correction pressure as the correction amount based on the correction characteristics and the generated displacement command, when the normal control mode is selected, and

the calculating unit corrects the required displacement control pressure required to provide a displacement angle corresponding to the generated displacement command with the correction pressure, when the normal control mode is selected.